

Knowledge System in Development of Energy Technology

Abstract: The purpose of Energy study is to share that all life on earth depends upon energy. Energy from sun is used by plants to make food. Plant food is needed to sustain life by providing nourishment for our bodies and muscles. The sun's energy is also stored in coal, wood and oil, used to produce food and modify matter. All of the achievements of mankind were sustained through the use of energy. This is the time when human started utilizing fossil fuel to create cities that dwarf the ancient wonders and operate machines that do the work of hundreds of humans in a fraction of the time.

My study will show that how Development in Energy Technologies based on earth fossil fuels allow an exponential increase in the populations and the standards of living in industrializing states. This economic realignment had multiple effects, many of are still with us today: environmental degradation as greenhouse effect, global warming, and limited fossil fuel left.

My aim is to analyze knowledge system in Development of Energy Technologies from First Industrial Revolution till today. To understand Development of Energy Technologies, the events that occurred in past and continued till today are studied. Linkage between Research & development in energy technologies, energy generation through fossils and natural resources as well as their impact on environment and contribution to society is explored. Policies and Legislations developed in order to obtain green clean environment, to protect our natural resources and to manage equal distribution of resources and to avoid electricity black outs and brown outs.

I conclude that energy is the most relevant issue of today. Sustainable energy is now the key for a brighter future.

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I. NEED OF STUDY

Beginning of history saw, people have looked for ways of making work easier. At first they domesticated animals in order to perform hard labor. They made use of wood and coal to heat up their homes, in addition to water to mill wood and ground grain. Alexandria used fire and water that the first steam engine in 150 BC. The study of some of the pioneers such as James Watt (1736-1819) with his improvements to the steam engine of Thomas Newcomer (1663-1729) and some of his successor's discoveries caused significant changes in the history of civilization.

The First Industrial Revolution (1760-1840) saw steam-powered machines replace human labor in industry. During those years, improvements in transportation, communication, and technology were so rapid and great that call a revolution, changes were remarkable however the revolution brought many

problems. There was a new demand for sources of energy and fuel. Factories and new forms of transportation brought pollution and some new danger.

The Second Industrial Revolution saw electricity replace steam as the main power source in industry. Major innovations were made in the use of new energy sources such as gas and electricity. Electricity was applied to transportation and communications. The use of electricity promoted growth on a large scale. Consumer goods were produced in bulk. The Second Industrial Revolution was an electric revolution.

The third Scientific Technical Revolution 1945 onwards. New discoveries and advances in science and technology came thick and fast. In 1949, the first practical programmed electronic computer ran mathematical problems. 1960s, the electronic silicon chip was invented, and computers became smaller and more powerful. Today energy technology Shifting to

renewable energy, Transforming the building stock of every continent into micro-power plants to collect renewable energies on-site, Deploying hydrogen and other storage technologies in every building and throughout the infrastructure to store intermittent energies, Using Internet technology to transform the power grid of every continent into an energy internet that acts just like the Internet (when millions of buildings are generating a small amount of renewable energy locally, on-site, they can sell surplus green electricity back to the grid and share it with their continental neighbors, and Transitioning the transport fleet to electric plug-in and fuel cell vehicles that can buy and sell green electricity on a smart, continental, interactive power grid.

II. ENERGY

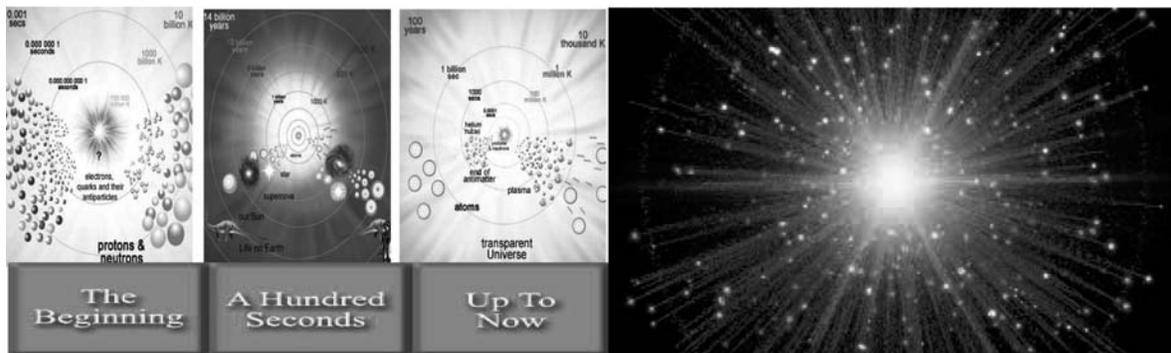


Fig. 1 (Source: Google website search for Big Bang theory)

Energy was born around 17 billion years ago when our universe was created in a gigantic explosion called the Big Bang. At first, the universe was almost all energy at tremendously high temperatures. As the universe expanded and cooled, some of the energy formed matter. While the universe continued to evolve, and made up of components matter and energy. This energy produced in the big bang is the same energy that we use today to run our radios, in the gasoline that powers our cars, and in the food we eat that gives us the energy to live, it took millions of years for the stars and galaxies that we see in the sky to form.

People tried to make their work easier with the discovery of fire to survive. Steam powers were developed to make the mechanical work easier, Research of law of thermodynamics made human to

design steam engine, which replace human labor and led to first industrial revolution. Industrial revolution developed society perceptions and knowledge system. People tried to make their life more comfortable by exploring energy of sun, wind and water. Previously whale oil was used to illuminate lamps, later on with gasoline, alcohol, natural gas, vegetable oil and kerosene. With the inventions in generation of electricity, man started looking for liquid fuel like petrol. Dependence on other countries for fossil fuels increased.

Earlier sun energy utilize to cook food by solar thermal collector which further develop to generate electric current by keeping certain element to exposed sunlight.(only theoretical thought). Electrolysis theory knowledge impart to photovoltaic cell and contributed to research of photoelectric effect to generate electricity.

Knowledge of electricity impart researchers to invent electricity appliances and theories to generate electricity. Electromagnetism concept develop transmission of electricity through DC (direct current), further researchers develop ac (alternate current), with knowledge impart, AC voltage can be easily changed by simple transformer and having less transmission loss. Research of Electromagnetism (turbine moves coil around magnet and produce electric current) based on principle of electric transformer and generator is the basic principle of formation of power plants for energy generation.

Law of conservation of energy impart research of appliances by converting electrical energy into sound, light and heat energy. Nuclear electrical energy generated by nuclear fission. Researches in energy helped society

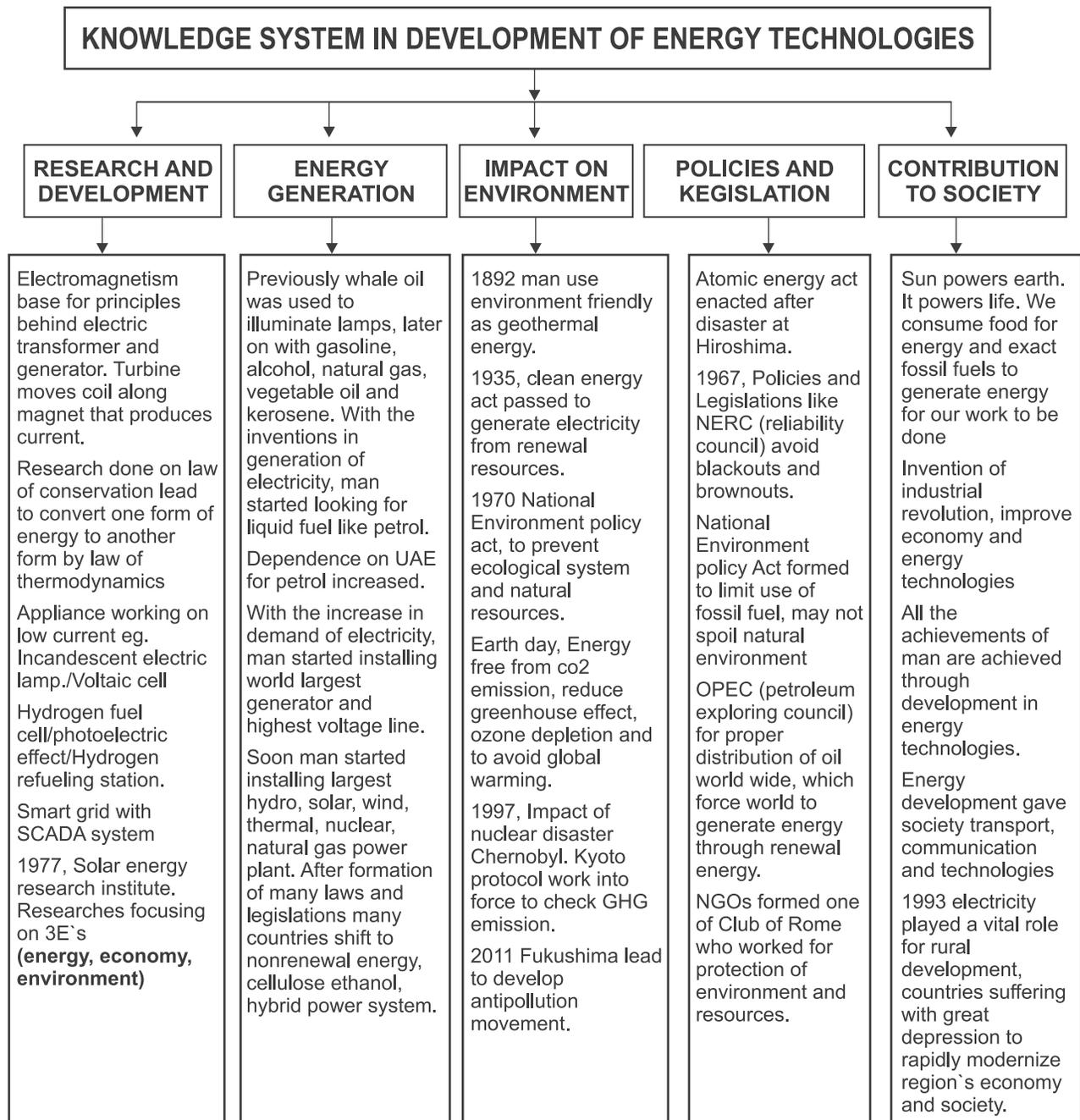
to store energy through different technology. Silicon solar cell, contribute to society to store sun energy but very expansive technology.

Earth's nonrenewal resources are limited; will not able to fulfill future demand. Research Institutes are opened up, working efficiently to develop alternate resources to generate energy. Today man started with

coal, installing world largest generator and highest voltage line, due to increasing demand of energy. Knowledge of Hydrogen researches made scientist to store energy; sun energy is stored in the form of photo voltaic cell, of fuel cell. Researchers carried out to store energy from sun, wind and water. Hydrogen can also be extracted directly from energy crops, animal and forestry waste, and organic garbage so called

FINDINGS AND SUMMARY

Fig. 2. (Source: Author self-proposed Findings and Summary)



biomass without going through the electrolysis process and hydrogen works to generate electricity.

Largest black out in America was due to lack of voltage and current monitoring. SCADA system developed to monitor efficient energy transmission and distribution utilities to consumer. Environmental laws and legislations made countries to shift to renewal energy, cellulose ethanol, hybrid power system. Research shown substantial increase in greenhouse gas emissions and retooling the planet's energy system. Scientists working for rapid deployment of low carbon technologies to balance energy policies, increase energy security and achieve sustainability targets. Improvements in renewable technologies and cleaner-burning fossil fuels are at great momentum and save our natural environment.

III. CONCLUSION

To fulfill today's energy demand we are extracting our fossil fuel, which takes years to form is on verge of depletion and will not be there for future use. Energy Generation had significant impact on natural environment like Detroit air quality, global warming and greenhouse effect.

Research and Idea's need to be explored for sustainable future.

Shifting to renewable energy.

- Building block must transform into micro-power plants to collect renewable energies on-site to serve as both "power plants" and share to grid.
- Deploying hydrogen and storage technologies to store intermittent energies
- Conversion of intermittent supplies of renewal energy sources into reliable assets like batteries, other media. Hydrogen is the universal medium that "stores" all forms of renewable energy.
- Hydrogen is the lightest and most abundant element in the universe and when used as an energy source, the only by-products are pure water and heat. our spaceships have been powered by high-tech hydrogen fuel cells for more than 30 years.

- **Smart technologies** that made possible the internet, and vast "distributed" global communication networks, we have to reconfigure our world's power grids so that people can produce renewable energy share and work as energy internet.
- Transitioning the transport fleet to electric plug-in and fuel cell vehicles that can buy and sell green electricity on a smart, continental, interactive power grid.
- Energy Grids were planned 100 years back which are not able to fulfill today's need of utilities with low reliability of power, outages, and aging grid, which is need to be upgraded need to be replace by **Smart Grid**.
- SCADA system investigates the fault and monitors the lack of voltage and current, which contribute blackouts and brownouts.
- Researches focusing on 3E's are as ENERGY, ENVIRONMENT AND ECONOMY.
- **Further Researches need to be done-**

Algae are the future of clean, inexpensive fuel.

- Once the algae is fully grown, it is harvested using Origin Oil's Algae Appliance and processed into biomass that has nearly the same energy potential as coal and is used to run the energy's systems.
- Max. Solid waste utilizes to generate electricity.
- Amount of energy in lightning strike can illuminate the city like Delhi; research must be done to store energy of lightning strike.

Need to develop Piezoelectricity.

- The process whereby the piezoelectric effect takes place is based on the fundamental structure of a crystal lattice.
- Crystals generally have a charge balance where negative and positive charges precisely nullify each other out along the rigid planes of the crystal lattice.
- When this charge balance is disrupted by an external force, such as, applying physical stress to a crystal, the energy is transferred by electric

charge carriers, creating a surface charge density, which can be collected via electrodes.

- Such energy can be stored in capacitors and power can be channeled to energy deficient regions.

REFERENCES

1. <http://thethirdindustrialrevolution.com/>
2. <http://technicity.daimler.com/en/jeremyrifkin-2/>
3. <http://www.britannica.com/EBchecked/topic/287086/Industrial-Revolution>
4. <http://energy.gov/management/office-management/operational-management/history/doe-history-timeline>
5. http://www.skwirk.com/p-c_s-14%20_u-424_t-1099_c-4247/introduction/nsw/history/the-industrial-revolution/the-industrial-revolution
6. <http://alternativeenergy.procon.org/view.timeline.php?timelineID=000015>
7. <http://www.timetoast.com/timelines/119691>
8. <http://energy.gov/management/office-management/operational-management/history/doe-history-timeline/timeline-events>
9. <http://energy.gov/management/office-management/operational-management/history/brief-history-department-energy>
10. <http://www.electricityforum.com/a-timeline-of-history-of-electricity.html>
11. <http://www.timetoast.com/timelines/ten-important-events-in-the-history-of-energy>
12. <http://danielyergin.com/world-energy-timeline/>
13. http://www.ucsusa.org/clean_energy/our-energy-choices/a-short-history-of-energy.html
14. http://www.academia.edu/1842268/History_and_Present_technological_development_in_Electrical_energy_sector
15. <http://www.galvinpower.org/history/energy-timeline-power-through-time>
16. http://en.wikipedia.org/wiki/History_of_electromagnetic_theory
17. <http://inventors.about.com/library/inventors/blelectric.htm>
18. http://en.wikipedia.org/wiki/History_of_electric_power_transmission
19. <http://www.electricityforum.com/a-timeline-of-history-of-electricity.html>
20. <http://www.fi.edu/learn/case-files/energy.html>

